

REMARKS

Applicants would like to thank the Examiner for careful consideration given to this application. Claims 1 and 3-24 are pending in the application. Claim 2 has been cancelled. Independent claims 1 and 11 have been amended to further define the deformation as “irreversible” deformation. Support for this amendment can be found, for example, in paragraph [0060] of the Applicants’ as-published application. No new matter has been added.

35 U.S.C. § 112

Claim 2 stands rejected under 35 U.S.C. § 112, second paragraph, for indefiniteness. Applicants have cancelled claim 2 without prejudice, thereby rendering the Examiner’s rejection moot. Withdrawal of this rejection is respectfully requested.

35 U.S.C. § 102

Kuroyama et al.

Claims 1, 2, 4-7, 11, and 17-20 stand rejected under 35 U.S.C. §102(b) for anticipation by U.S. Patent No. 5,183,362 to Kuroyama et al. (hereinafter “Kuroyama”). The Examiner states that Kuroyama teaches a tool insert where “the tip and insert are assembled together by soldering/placing in an oven of high temperature (600- 800 degree Celsius) which of course irreversibly deforms the mating surfaces.” The Examiner further suggests that “this is equivalent to what is claimed in claim 1, i.e. mechanical forces derived from deformation of the mating geometrical features on the abrasive tip and /or the insert body.”

Applicants respectfully disagree. The Examiner is incorrect in the conclusion that Kuroyama’s teaching that “the tip and insert are assembled together by soldering/placing in an oven of high temperature (600-800 degree Celsius)”, results in irreversible deformation of the mating surfaces as recited in the present claimed invention.

Kuroyama clearly fails to teach or suggest a tool insert as recited in amended independent claim 1 or a method of forming such as recited in amended independent claim 11. In particular, Kuroyama fails to teach or suggest a tool insert where the abrasive tip is retained in the insert body primarily by mechanical forces derived from irreversible deformation of the mating geometrical features.

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First and foremost, Kuroyama fails to suggest, least alone teach, deformation of the mating surfaces. Kuroyama specifically discloses and requires soldering of a tip and an insert at about 600° to 800° C, and that “sufficient bond strength can be formed between the base and the support 3b, since both have excellent wettability to the solder 4” (col. 5, lines 11-14). Applicants submit that one skilled in the art recognizes that the process used by Kuroyama is that of “brazing” as the filler metal melts at a temperature above 450°C but below the base material’s melting temperature. It appears that during the translation of Kuroyama “brazing” may have been inadvertently translated as “soldering”. Accordingly Applicants direct the Examiner to the definition of “brazing”:

“Brazing does not involve any melting or plastic state of the base metal. Brazing comprises a group of welding processes in which coalescence is produced by heating to suitable temperatures above 450 degree C and by using a ferrous and/or nonferrous filler metal that must have a liquidus temperature above 450 deg C and below the solidus temperature of the base metal.....Brazing has four distinct characteristics: (1) The coalescence, joining or uniting of an assembly of two or more parts into one structure is achieved by heating the assembly or region of the parts to be joined to a temperature of 450 deg C or above; (2) Assembled parts and brazing filler metal are heated to a temperature high enough to melt the filler metal but not the parts; (3) The molten metal spreads into the joint and must wet the base-metal surfaces; and (4) The parts are cooled to freeze the filler metal, which is held in the joint by capillary attraction and anchors the part together.” Schwartz, M. M., Brazing, ASM International, 1990 (ISBN : 0-87170-246-0)

Accordingly, the definition of brazing further supports that the base metals of the tip and the insert of Kuroyama do not and moreover cannot “irreversibly deform” because brazing merely promotes and relies on adhesion or retention of the tip into the insert by a “wetting action” of the filler metal, which is precisely what is taught by Kuroyama (col. 5, lines 8-14). Conversely, the Applicants’ claimed invention relies on the forces resulting from irreversible or plastic deformation to secure the abrasive tip to the insert body without any need for brazing. As such, Kuroyama teaches away from amended independent claims 1 and 11 where the abrasive tip is retained in the insert body primarily by mechanical forces derived from

irreversible deformation of the mating geometrical features on the abrasive tip and/or the insert body.

Moreover, examination of the properties of a tip and an insert further support that there is no irreversible deformation in the teachings of Kuroyama. While the Examiner cites deformation due to heating during the brazing cycle, Applicants argue that heating expands both the insert body and the abrasive tip. The tip, having a different coefficient of thermal expansion may expand less than the insert body. This will eliminate stress between the two parts. Both the tip and the insert body are hard and strong materials, and may only expand elastically (reversibly) during heating to the 600 – 800° C temperatures taught by Kuroyama. For example the tip may include cubic boron nitride, which has a melting point of 2967° C.. An insert body may include tungsten carbide, which has a melting point of 2870°C. These materials will not yield or be deformed irreversibly by thermal strain alone, and certainly would not melt at brazing temperatures. Accordingly, a brazing temperature of 600°-800° C, as taught by Kuroyama, would not result in irreversible deformation of a tip or an insert body of the present claimed invention.

Applicants further maintain that at least all of the aforementioned arguments equally apply to amended independent claim 11. Kuroyama fails to teach or suggest that there are “respective mating geometrical features causing irreversible deformation in at least one of the mating features”, as recited in claim 11.

Accordingly, Applicants maintain that Kuroyama fails to teach each and every element of amended independent claims 1 and 11 for at least the reasons stated above and respectfully request reconsideration and withdrawal of the Examiner’s rejection. Claims 4-7 and 17-20 either directly or indirectly depend from and add further limitations to amended independent claims 1 and 11, respectively, and are deemed allowable for at least the same reasons in connection with amended independent claims 1 and 11. Reconsideration and withdrawal of the Examiner’s rejection is respectfully requested.

Claims 1, 3, 9-16, 22, and 23 stand rejected under 35 U.S.C. § 102(b) for anticipation by U.S. Patent No. 5,846,032 to Murakami. The Examiner states that Murakami teaches a tool insert (2) having a body (4) with a plurality of elastic deformation sections (8) that

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allow the geometric features to be interlockable and an abrasive tip (5), wherein the abrasive tip and the insert body containing mating geometric features.

Murakami fails to teach or suggest a tool insert as recited in amended independent claim 1 or a method of forming such as recited in amended independent claim 11. In particular, Murakami fails to teach or suggest a tool insert where the abrasive tip is retained in the insert body primarily by mechanical forces derived from irreversible deformation of the mating geometrical features.

Applicants submit that Murakami relies on elastic deformation, (or interchangeably, reversible) deformation to retain the tip in a substrate, as also recited by he Examiner in the Office Action, and does not teach that the abrasive tip is retained in the insert body primarily by mechanical forces derived from irreversible (or interchangeably, plastic) deformation of the mating geometrical features on the abrasive tip and/or the insert body, as recited in amended independent claim 1.

The fact that Murakami specifically teaches elastic deformation is further exemplified in Murakami's teachings that "[t]he portions on both sides of the slit 6 are elastic deformation sections 8, capable of moving toward each other and be elastically deformed. The front end of this elastic deformation section 8 has formed engaging sections 10 for clamping tip bit 5" (col. 2, lines 54-58). Accordingly, this demonstrates that Murakami teaches away from the abrasive tip being retained in the insert body primarily by mechanical forces derived from the irreversible deformation of the mating geometrical features on the abrasive tip and/or the insert body as recited in the present amended independent claims. By spreading out the elastic clamping force over wider cross sections of material, the design of Murakami further eliminates the possibility of irreversible (or plastic) deformation.

Conversely, the present claimed invention is directed to using mechanical forces derived from irreversible deformation as illustrated in the specification, in that once a tip is press fit into an insert body at a given level of attachment, and subsequently removed, it cannot be press fit into the same insert body with the same force, to create the same attachment. This is because of the requirement of irreversible deformation of the mating features of the tip and/or body that occurs when the tip is press fit into the insert body.

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Applicants further maintain that all of the aforementioned arguments equally apply to amended independent claim 11. Murakami fails to teach or suggest that there are "respective mating geometrical features causing irreversible deformation in at least one of the mating features", as recited in amended independent claim 11.

Based on at least the aforementioned arguments, Applicants maintain that Murakami fails to teach every element of amended independent claims 1 and 11, and respectfully request reconsideration and withdrawal of the Examiner's rejection. Claims 3 and 9-10, and claims 12-16, 22 and 23 either directly or indirectly depend from and add further limitations to amended independent claims 1 and 11, respectively, and are deemed allowable for at least the same reasons in connection with amended independent claims 1 and 11. Reconsideration and withdrawal of the Examiner's rejection is respectfully requested.

35 U.S.C. § 103

Claims 8, 21, and 24 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kuroyama in view of U.S. Patent Publication No. 2002/0190105 to Kanada et al. (hereinafter "Kanada").

Applicants have presented arguments herein that establish that Kuryoama fails to teach or suggest a tool insert or a method of forming a cutting tool insert as recited in amended independent claims 1 or 11. Applicants submit that the combination of Kuryoama and Kanada fail to render amended independent claims 1 and 11 obvious and therefore the combination of references cannot render claims 8, 21 and 24 obvious as claims 8, 21 and 24 add further limitations to amended independent claims 1 and 11. Applicants respectfully request withdrawal of the Examiner rejection of claims 8, 21, and 24.

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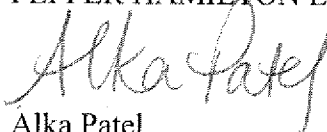
CONCLUSION

In view of the aforementioned claim amendments and remarks, Applicants respectfully request reconsideration and withdrawal of the rejections. Applicants maintain that all reasons for rejection have been traversed and made moot by the aforementioned amendments and arguments, and request allowance of all pending claims in the present application.

No fee is believed to be due for this submission. However, the Commissioner is hereby authorized to charge any fees which may be required for this submission or credit any overpayment to Deposit Account No. 50-0436.

Should the Examiner have any questions or comments, or need any additional information, she is invited to contact the undersigned at her convenience.

Respectfully submitted,
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